OMNI BUNDLE

The Omni Bundle package is the first of its kind to facilitate robotics and haptics technology education through an inviting MATLAB/Simulink interface.

COST-EFFECTIVE WAY TO INTRODUCE ROBOTICS AND HAPTICS

The Omni Bundle is a cost-effective and safe way to introduce intermediate and advanced control concepts and theories related to robotics and haptics. Combining Geomagic Touch™ (formerly SensAble Phantom Omni) haptic device with QUARC® control software and comprehensive Quanser-developed curriculum allows students to easily translate course theory into hands-on experience.

NOVEL ROBOTICS AND HAPTICS CURRICULUM

The courseware material provided with the package exposes students to fundamental robotics concepts, such as forward and inverse kinematic modeling, Jacobian, PID control and path planning. The courseware also covers more advanced haptics concepts, such as force calculation, collision detection and virtual objects dynamics.

Using the haptic-based exercises provided in the courseware, students can quickly create basic virtual environments and use this as a basis for design of more complex multi-object environments, multi-contact haptic interaction, force feedback, teleoperation and cooperative haptics.

HOW IT WORKS

The Geomagic Touch haptic device is a robot with six revolute joints, three of which are actuated. The three non-actuated joints are the wrist joints.

The three motors can actuate the end-effector - the tip of the stylus - to span the entire X, Y, Z region in its workspace. Position measurement along X, Y, and Z is done using digital encoders while measurement of rotations about these axes (roll, pitch and yaw) is done using potentiometers.

QUARC real-time control software provides the interface to interact with the device.

"The ability to quickly 'feel' out your ideas creates a 'wow' factor that is not there in many other similar toolkits. Highly recommended!"

Professor Daniel Wang,
University of Waterloo

System specifications on reverse page.

OMNI BUNDLE WORKSTATION COMPONENTS

Geomagic Touch™ (formerly SensAble Phantom Omni)

QUARC real-time control software for MATLAB®/Simulink® - Robotic License

Quick Start Guide, Instructor and Student Workbooks (provided in digital format)

Sample pre-built controllers and complete dynamic model

Omni Bundle workstation

SYSTEM SPECIFICATIONS

Omni Bundle

CURRICULUM TOPICS PROVIDED

- Forward kinematics and D-H parameters
- Inverse kinematics
- Joint level PD and PID control
- Trajectory planning (joint space vs. task space)
- Jacobian derivation and application
- Various *force law* haptic rendering (force fields, hard and soft contacts, etc.)
- Graphics development using Quanser 3D Viewer

FEATURES

- CE certified Geomagic Touch (formerly SenAble Phantom Omni) haptic device
- Six degree-of-freedom positional sensing
- Portable design and compact footprint for workplace flexibility
- Removable stylus for end-user customization
- Two integrated momentary switches on the stylus for ease-of-use, and end-user customization
- Wrist rest to maximize user comfort
- Constructed of metal components and injection-molded plastics
- Stylus-docking inkwell for automatic workspace calibration
- Fully compatible with MATLAB®/Simulink®
- Fully documented system models and parameters provided for MATLAB®, Simulink®
- Open architecture design, allowing users to design their own controller

DEVICE SPECIFICATIONS

Force feedback workspace (W x H x D)	160 mm x 120 mm x 70 mm
Footprint (physical area device occupies on desk)	168 mm x 203 mm
Device mass	1.8 kg
Range of motion	hand movement pivoting at wrist
Nominal position resolution	> 450 dpi / 0.055 mm
Maximum exertable force at nominal position	3.3 N
Continuous exertable force (24 hrs.)	0.88 N
Stiffness	1.26 N/mm (X axis) / 2.31 N/mm (Y axis) / 1.02 N/mm (Z axis)
Inertia (apparent mass at tip)	45 g
Force feedback	x, y, z
Interface	USB

COMPLETE WORKSTATION COMPONENTS

Plant	Geomagic Touch™ (formerly SensAble Phantom Omni) haptic device
Control design environment	Quanser QUARC® add-on for MATLAB®/Simulink®
Documentation	Quick Start Guide, Instructor and Student Workbooks
Real-time targets	Microsoft Windows®

Sample controller(s) are supplied

About Quanser:

Quanser is the world leader in education and research for real-time control design and implementation. We specialize in outfitting engineering control laboratories to help universities captivate the brightest minds, motivate them to success and produce graduates with industry-relevant skills. Universities worldwide implement Quanser's open architecture control solutions, industry-relevant curriculum and cutting-edge work stations to teach Introductory, Intermediate or Advanced controls to students in Electrical, Mechanical, Mechatronics, Robotics, Aerospace, Civil, and various other engineering disciplines.